Parents experiences of tooth brushing with children: a qualitative study

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Knowledge Transfer Statement

The results of this study will be used to develop a behaviour change intervention to encourage parental supervised tooth brushing. The intervention, which is likely to be delivered through health practitioners rather than dental teams, will be developed to reduce dental caries among young children and will require evaluation in terms of its clinical and cost effectiveness.

Abstract

Background: Globally, dental caries is one of the most prevalent diseases and is more common in children living in deprived areas. Dental caries is preventable and guidance in the UK recommends Parental Supervised Brushing (PSB) which is a collection of behaviours including twice daily tooth brushing with fluoridated toothpaste that should begin upon eruption of the first tooth (approximately 6-12 months of age), and that "children need to be helped or supervised by an adult when brushing until at least seven years of age". The aim of this study was to explore with parents from deprived areas of the UK their experiences of tooth brushing with their young children and establish barriers and facilitators to parental supervised brushing at individual, interpersonal and environmental levels using the Theoretical Domains Framework (TDF).

Methods: Qualitative semi-structured interviews guided by the TDF were conducted with 27 parents of young children (under seven years) in two deprived areas of the UK. Framework analysis was used.

Results: Parents were not aware of national guidance concerning their active involvement in tooth brushing, but did have detailed knowledge of tooth brushing practices for children and their intentions were to brush their children's teeth themselves twice every day as part of a family routine. However, difficulties experienced managing their children's challenging behaviour and the environmental context of their stressful lives meant that many parents adopted a role of simply reminding their children to brush or watching them brush.

Conclusions: The main barriers to PSB among parents living in deprived areas were skills in managing their children's behaviour and environmental influences on family life. The results of our study have clear implications for the development of appropriate interventions to address the modifiable barriers to improve parental adoption of PSB.

Introduction

Globally, dental caries is one of the most prevalent diseases with an estimated 621 million children with untreated caries in their primary teeth, reaching peak prevalence at 6 years of age (Kassebaum et al. 2015). The consequences of dental caries for children include pain, loss of sleep, problems with eating and speaking and time off school (American Academy of Pediatric Dentsitry 2014; Gilchrist et al. 2015). The Global Burden of Disease study in 2010 found that in the United Kingdom (UK) an average of 2.2 hours of children's healthy life was lost for every child aged 5-9 years because of poor oral health. In comparison, the disability associated with vision loss is an average of 1.6 hours and for diabetes mellitus 1.5 hours (Murray et al. 2013). The financial impact is also significant, treating oral diseases in the National Health Service (NHS) in England costs £3.4 billion annually (in addition to an estimated £2.3 billion spent in the private sector). Dental extractions under general anaesthesia are also costly with an estimated cost in 2011-12 of around £23 million (Public Health England 2014a). Reducing the prevalence of dental caries in children is a UK public health priority (Department of Health 2012).

The relationship between dental caries and socio-economic status has been confirmed to be strong and consistent (Schwendicke et al. 2015). The 2013 UK Child Dental Health Survey revealed that 31% of five-year-olds had obvious caries experience with wide variation in the proportion affected between children who were of low income and eligible for free school meals (41% of 5-year-olds) when compared to those who were not eligible (29% of five-year-olds)(Pitts et al. 2015). The relationship between ethnicity and dental caries is more complex. Higher levels of dental caries are generally seen in the primary teeth of children of Pakistani, Bangladeshi and East European origin even after adjusting for socio-economic status probably due to diet and oral health behaviours (Conway et al. 2007, Marcenes et al. 2013).

Caries is preventable and one of the most effective ways of preventing caries is regular tooth brushing with fluoride toothpaste (Marinho et al. 2003). Oral health guidance in the UK recommends Parental Supervised Brushing (PSB). PSB is a collection of behaviours including twice daily tooth brushing with fluoridated toothpaste that should begin upon eruption of the first tooth (approximately 6-12 months of age), and that "children need to be helped or supervised by an adult when brushing until at least seven years of age" (Public Health England 2014b, Scottish Intercollegiate Guidelines Network 138 2014). However, reports suggest that this guidance is not being translated into practice, as the most recent national data suggest a large proportion of UK children (50% of five-year-olds) brush their teeth without any adult

involvement (White et al. 2006). This is a significant problem as observational studies have found caries experience at six years is strongly associated with low frequency of tooth brushing, late initiation of brushing and lack of parental involvement in brushing (Duijster et al. 2014).

It is important to identify barriers and facilitators (also referred to as determinants) that parents report which affect implementation of PSB in order to develop effective interventions. Previously a range of barriers have been identified including lack of knowledge and understanding of the importance of primary teeth, the cost and availability of toothbrushes/toothpaste, difficulty establishing a routine, the influence of family, and managing child behaviour (Amin and Harrison 2009, de Jong-Lenters et al. 2014, Elison et al. 2014, Prowse et al. 2014, Trubey et al. 2015, Wong et al. 2005). However, there are some limitations with the research in this area. First, with the exception of a study by Elison and colleagues (Elison et al. 2014) PSB has not been the primary focus of previous studies which have examined a range of oral health practices. Of studies that have focused specifically on PSB, participants were largely limited to parents of white ethnic origin, with children 3 to 6-years, children without caries and tended to be from families of middle to high socio-economic status. Finally, most studies lack a theoretical framework for exploring determinants of behaviour, and this may mean that they fail to consider the full range of influences within the context of PSB.

The Theoretical Domains Framework (TDF) (Francis et al. 2012) identifies 12 key domains of behavioural determinants including knowledge, skills, intentions, goals, social influences and beliefs about capabilities which are thought to influence behaviour. It provides a useful framework for understanding a wide range of behavioural determinants at different levels of influence (individual, interpersonal and environmental) and relationships within and across these levels. The TDF has been used successfully to identify important determinants of behaviour in health practitioners and members of the public (Francis et al. 2012) in contexts including dental behaviours (Bonetti and Clarkson 2010, Gnich et al. 2015), but has not yet been applied to parents.

The aim of this study was to explore with parents living in deprived areas of the UK their experiences of tooth brushing with their young children and establish barriers and facilitators to PSB. These barriers and facilitators will be described at individual, interpersonal and environmental levels using the TDF (Francis et al. 2012).

The findings of this study will inform the development of an intervention to address the modifiable barriers to improve parental adoption of PSB.

Method

Overview

The study involved a qualitative exploration using semi-structured interviews guided by the TDF with parents of young children living in two deprived areas of the UK.

Participants

Parents of children under seven years from Barnsley or Bradford were invited to participate. Barnsley and Bradford are both in the 10% most deprived local authorities in England. Epidemiological data suggests a higher prevalence of dental caries in Barnsley and Bradford, the average number of decayed, missing and filled teeth ($d_3$mft) in five year olds were 1.61 and 1.98 respectively in 2011/2012 compared to the England average of 0.94 (Public Health England 2013).

Ethical approval

Ethical approval was obtained from National Research Ethics Committee-North of Scotland (Reference number: 14/NS/0093).

Recruitment

Participants were purposively sampled using a maximum variation approach to ensure that parents (or caregivers with parental responsibility) living in deprived areas, of different genders, ages of children, ethnicities, first languages, children with and without dental caries and dental attendance patterns were included. These characteristics were chosen based on factors identified in the literature as being influential (Marcenes et al. 2013, Pitts et al. 2015, Godson and Williams 1996, Sasahara et al 1998, Pani et al 2012). Potential participants were identified from previous research projects, children's centres and from community dental clinics to identify a diverse group of participants who lived in areas of high deprivation. Recruitment continued until saturation was achieved and no new data emerged (Sandelowski 1995).

Thirty six parents were identified in Bradford from those who had previously participated in research projects. These parents were sent an information sheet and then contacted by a researcher by telephone. Seventeen parents were reached by telephone. Thirteen parents gave initial consent and agreed to participate.

An independent organisation that represents the views of the public (Healthwatch Barnsley) was approached to identify children's centres located in deprived areas of Barnsley that may be amenable to involvement in research. One centre agreed to facilitate the interviews and issued participant information sheets to suitable parents. Interviews were arranged at the children's centre for eleven parents wishing to proceed.

Seven parents with children attending the Bradford and Barnsley Community Dental Services were approached by their dentists. They were given brief verbal information about the study and a written information sheet, and agreed to be contacted by a researcher by telephone. Contact was made with six parents by telephone and three agreed to participate.

Reasons for non-participation included reluctance to take part in a qualitative interview, being 'too busy' and family events such as moving house or illness.

Procedure

Written informed consent was obtained from all participants and they were asked to self-report their ethnicity based on the UK Office for National Statistics ethnicity classification. A topic guide was used based on the TDF to identify determinants of behaviour although it was not so rigidly applied as to restrict participants from generating new ideas. Interviews conducted by four trained researchers from different disciplines in either English or Urdu. The topic guide was modified as the interviews progressed in response to evolving findings. Interviews were recorded, transcribed verbatim in English and anonymised. Data were collected between June 2014 and February 2015.

Analysis

Qualitative framework analysis was used guided by the TDF. Framework analysis is a pragmatic approach to qualitative research which draws on both inductive and deductive processes and is designed to be rigourous, valid and produce results that can be easily interpreted and findings that are readily implemented (Ritchie and Spencer 1994). The analysis involved the following stages:

1. Identifying initial themes

First, five interviews were conducted and the transcripts were read and notes made independently by three researchers (HR, SA and ZM) on the general fit to the TDF, the specific content of each TDF domain, its component constructs and data that emerged outwith the TDF.

These notes were discussed and disagreements resolved before discussion with a fourth analyst (RM). RM and SA had previous experience of using the TDF.

2. Labelling the data

Each section of these five transcripts was labelled independently by two researchers (HR and SA) with an index number to represent the TDF domain to which the data related and to which of its component constructs. This was discussed with ZM and RM and further discussions held to clarify the boundaries between the domains.

3. Sorting the data by theme

Data with the same index number were brought together by SA and discussed by four analysts (HR, SA, ZM and RM).

4. Synthesising the data

Thematic charts were created for each of the TDF domains retaining the context and language used in the data. These thematic charts were discussed (ZM, SA, HR, RM, PD, K G-B) and modifications made. The remaining interviews were then conducted and transcripts were then labelled and sorted by ZM and SA. Subsequently, interactions between levels (individual, interpersonal and environmental), domains and explanations for these interactions were discussed and agreed.

Results

In total saturation was reached after 27 interviews had been conducted across Bradford and Barnsley (n = 27). Of the 27 interviews, 13 took place at participants' homes, 11 were conducted at a children's centre, two were conducted at a research institute and one interview was conducted by telephone. Participants were 22 mothers, 2 fathers and 3 grandmothers. Of these, 15 were of White British ethnicity, 10 were Pakistani, 1 was Polish and 1 was Russian. The majority of interviews were conducted in English (n=23) with the remaining four conducted in Urdu. Most participants had more than one child (n=16) with a third having three or more children (n=9). Twenty-one participants had taken their children to visit the dentist (Table 1). Based on the postcode and the Index of Multiple Deprivation 2010 the majority (n= 18) lived in the 'most deprived' areas of England, seven lived in areas categorised as 'more deprived' and two lived in areas of 'average' deprivation.

In summary, parents were not aware of national guidance concerning tooth brushing, but did have detailed knowledge of tooth brushing practices for children and their intentions were to brush their children's teeth twice every day as part of a family routine. However, difficulties experienced managing their children's challenging behaviour and the environmental context of their stressful lives meant that many parents adopted a role of simply reminding their children to brush or watching them brush, but this did not always occur, particularly at busy times of the day and weekends when routines were not enforced. As a consequence the extent of the tooth brushing for some children was a *'quick brush'* of their own front teeth as parents observed children often missing brushing their *'back teeth'*.

The main barriers and facilitators are summarised in Figure 1, the distinction between the individual, interpersonal and environmental levels of influence are highlighted and interactions between domains indicated. Reported barriers and facilitators did not appear to vary by ethnicity.

The detailed results will now be described according to the TDF and focused on PSB with illustrative quotes presented.

Parent's knowledge of tooth brushing

Parents knew that brushing with a fluoride toothpaste was important for good oral health and they generally had detailed knowledge of appropriate behaviours for young children, including the age at which brushing should commence, frequency of brushing and use of fluoride toothpaste.

"When I think about healthy teeth I think about brushing twice a day and less sugar and no sugar before bedtime" (father of a three year old child).

"He were five months old when he got his front two teeth, so I've been doing it since then" (mother of a four year old child).

"I use Colgate 0-3 year olds, I read it's better cos it contains fluoride in it" (mother of three and four year old children).

This detailed knowledge was therefore an enabling factor at an individual level although parents were often not aware of the guidance about the need to help their child brush until seven years of age, which represents a barrier to effective PSB.

"I don't think they've ever told us that under the age of seven you should brush your kids teeth – I've not been told that by my dentist" (father of a three year old)

Beliefs and emotions about the consequences of poor oral health behaviours and motivation to maintain good oral health for their children

Parents stated the consequences of not brushing their children's teeth including the sequelae of dental caries such as pain, sleepless nights, dental infections, poor appearance of teeth and the need for dental treatment.

"Well they'd just end up rotting and going bad and they'd have more dental appointments" (mother of three year old twins).

Parents described their own negative experiences of these sequelae, particularly about traumatic episodes at the dentist and the dental anxiety that resulted.

"I'll still probably have to go with them to the bathroom to make sure because I know I had a tooth problem and I suffered with it quite a bit so I don't want my kids to go through the same pain" (mother of three and four year old children).

"I've had a few bad experiences at the dentist so I like to make sure everybody has good teeth" (mother of four and six year old children).

Halitosis was an additional consequence described of children not brushing their teeth.

"You can actually smell their breath like when they are talking to you and if they've not brushed their teeth it really, really smells" (mother of two and four year old children).

Parents concerns about these consequences resulted in emotions of fear and worry:

"I know a lot of people that are absolutely terrified of the dentist. They show lots of things on TV about gum diseases and that's the main thing I'm actually scared of" (mother of two and four year old children)

"I worry a lot because of my middle child's teeth" (mother of a three month old baby, three and eight year old children).

These domains acted at an individual level as potential facilitators, motivating parents to want their children to attain good oral health and resulting in an intention to ensure their children brushed twice daily with a fluoride toothpaste.

Social influences on tooth brushing

As illustrated in the previous section the main sources of external social influences on parents were from the television, particularly from adverts for adult toothpastes. Other social influences came from grandparents. There was variation reported in the nature of the influence of

grandparents from being positive role models for their grandchildren to being a barrier to PSB when parents tried to insist on tooth brushing being performed in a certain way.

"With their Grandma and Grandad they get away with murder anyway so if they don't want to brush their teeth they are like why are you forcing them! I can't say nothing to them, it's a big family" (mother of two, four and six year old children).

"Her Grandad does, he's always in the bathroom and he's always reminding her, he's brilliant doing his" (mother of a five year old child).

While parents reported not routinely discussing tooth brushing with friends they did report observing the state of their friend's children's teeth and made internal comparisons of their own tooth brushing practices as parents with that of their friends.

"My mate was saying about her daughter who's the same age as mine about seven, and she was saying something about you know if on a day when she's really busy and the kids are tired she just tells them to go to bed! And I go do you tell them to brush their teeth and she goes no!" (mother of a six year old).

Social role of parents in children's tooth brushing

Mothers were largely perceived (by both mothers and fathers) to have overall responsibility within the family for children's tooth brushing practices, but while this was a consistent finding, the nature of the tooth brushing practices parents adopted differed.

"Cos I'm their mum and it's what mums do!" (mother of three year old twins)

Roles varied from those where mothers were actively engaged in the brushing of the children's teeth themselves (as per the national guidance) to those where mothers simply reminded their children to brush or were in the bathroom with them as they brushed. Parenting skills and styles appeared to determine the nature of the role.

"My youngest one she's three so I don't even trust her with the toothbrush, she plays with her toothbrush but when it is brushing time I do the brushing. I would be like "you're not going to get your teddy tonight" so I would use other things to encourage her and eventually she realised brushing is not a big deal, just gets done in two minutes" (mother of three and seven year old children).

"She likes doing it. She enjoys being sat in the bath and then she likes to brush her teeth. It's unbelievable to say she's only two, she doesn't like me doing it, she just kicks off, she does what she likes" (mother of a two year old child).

Parental skills involved in tooth brushing and behaviour regulation

Two types of skills were identified as being important for brushing children's teeth: manual skills of the individual parent in brushing and interpersonal skills in the management of young children's behaviour, with the latter being the most problematic. Regarding the manual skills of tooth brushing, while some concerns were expressed by parents about hurting their child, especially when starting to brush their teeth as babies, parents generally felt they had the necessary manual skills to do this.

"First, I tell her to open her mouth, and I do the top of the teeth, the bottom row, the top row, then I tell her close your mouth and give me a big smile so she does then I do the front, so all the way around and then I tell her to spit it out and that's it" (mother of two and four year old children, talking about her four year old).

For parents who reported difficulties with tooth brushing the main barrier appeared to be lack of parenting skills to manage their child's behaviour should the child be unwilling. Parents described how they began to brush their children's teeth as soon as they erupted, but often encountered challenging behaviour from children once they reached 18 to 24 months. Around this age parents experienced their children either crying because they did not want their teeth brushed, keeping their mouths closed to prevent their parents accessing their teeth or asserting their independence to want to brush their own teeth.

"He closes his mouth and he throws a tantrum, I do try quite a few times" (mother of two and four year old children, talking about her two year old child).

"Really bad tantrums, my two year old. I try to help because he cannot brush his teeth properly, he'll throw a tantrum, he throws the toothbrush at me, toothpaste at me and just lays on the floor and starts kicking his legs" (mother of two and four year old children, talking about her two year old).

At this stage variation in parent's responses to this behaviour were seen. Some parents continued brushing their children's teeth themselves, despite the resistance and regulated their child's behaviour either by restraining them or used other techniques, including distraction with songs, the use of rewards or bribery.

"He screams and he shouts. I have to hold him really tight and give them a good brush so that's what I do with him" (mother of one and three year old children, talking about her three year old).

Other parents, however, tried to continue brushing their children's teeth but found their children's behaviour too difficult to regulate and then 'admitted defeat'; subsequently adopting a supervisory or monitoring role over their children's tooth brushing, rather than having an active role in helping brush the child's teeth themselves as per the national guidance.

"I've tried to do it myself but then he just tenses his mouth shut, so I just leave him to his own devices" (grandmother with parental responsibility for a three year old child).

Parents who adopted a monitoring or supervisory role were aware that the nature of these roles meant their children often spent very little time brushing and often neglected *'their back teeth'*.

Beliefs about capabilities in managing their children's behaviours

Beliefs about capabilities in managing children's behaviour were typically expressed in terms of ability to 'control' children. There was variation in the degree of control, some parents perceived a lack of control over the interpersonal interaction with their child to be a barrier to helping them brush their child's teeth.

"Until she'll open her mouth, there's nothing I can do about it" (mother of three month old baby, three and eight year old children talking about her three year old)

Other parents believed themselves to be in control:

"The younger one I do hers. I brush her teeth in the morning and at night. They're children you have to do it. Yes, I keep control of all of that" (mother of one and three year old children).

The nature of the tooth brushing behaviours, the role of memory and environmental contexts

The three domains of the nature of the behaviour, memory and environmental context were inter-related. Parents consistently reported that tooth brushing was a routine behaviour for their children:

"It's a night-time and morning thing you do anyway when you wake up, so it automatically goes to brushing your teeth. It's not something I have to remind them to do; it's just something they know – even my little one" (father of two and four year old children)

However, they did report breaks in the routine and times when their children *'forgot'* to brush. Breaks in the routine often occurred at weekends, school holidays and 'sleepovers'.

"It could be, for example, if friends come over for the night, coming to sleep over, then they just forget about it 'cause getting playing, playing, playing with their friends" (mother of one, five and eight year old children).

Upon analysis of the instances when participants described *'forgetting'*, however, these events were typically not a function of memory, or indeed a result of individual factors but of interpersonal or environmental influences such as prioritising activities like getting children into bed, eating breakfast or leaving the house for school, particularly for parents who had reported

difficulties with their child's tooth brushing behaviours. It appeared that the times when tooth brushing typically takes place were also especially busy times in family life.

"Oh I just leave him sometimes or let him do what he wants to do basically 'cause mornings are busy" (mother of four and six year old children talking about the four year old).

"Struggle in a sense of sometimes, maybe like, if they're too tired at night and they're half asleep and I'm brushing their teeth and they don't really want to do it" (mother of three and four year old children).

In addition, parents described their environment in terms of the *'stressful'* circumstances in which they lived which made day-to-day life a *'struggle'* due to having several young children to look after, unemployment, debt, drug use, single-parenthood and domestic abuse, which explains why tooth brushing was understandably not a priority.

"My three youngest get up and brush their own teeth. But my oldest, he hates his teeth being brushed. He did live at my mums so I don't know if she's scared him when she's been brushing his teeth and that's put him off. I struggled" (mother of two, three, four and five year old children).

"So as they are getting ready to go out - have a wash, brush their teeth, get dressed, and then go. But when they go to their dad's, he doesn't bother, he doesn't bother with anything so... " (mother of three and four year old children).

"Because of my problems I've got so many people involved in [the child's] care. My mum advised me because we care for him together and she does all that side of things" (mother of a four year old child).

Discussion

The main barriers to the implementation of guidance on PSB were interpersonal difficulties of parents managing their children's behaviour within the environmental circumstances in which they lived. The likely consequences of these barriers include reduced duration, frequency and efficacy of tooth brushing in children. Although the relative contribution of tooth brushing and dietary modification to the overall risk of dental caries is yet to be fully elucidated, the potential to improve implementation of PSB by modifying parent's behaviours provides a significant opportunity to reduce the prevalence of dental caries in children living in deprived areas. However, as these health behaviours are the result of influences from multiple levels including individual, interpersonal and environmental; interventions to change behaviours need to be developed to account for these influences.

Previous studies have highlighted the importance of the family in childhood dental caries (Mattila et al. 2000) and parenting skills as being important for PSB (Collett et al. 2015, de Jong-Lenters et al.

2014, Huebner and Riedy 2010). A recent study also observed how parents who lacked the skills to carry out PSB tended to allow their child to brush their own teeth rather than persist with parental involvement (Collett et al. 2015). However, this literature has tended to focus on the need for PSB to be implemented in the home as a routine behaviour (Trubey et al. 2014) or cite poor family functioning (Duijster et al. 2014). The findings from this qualitative study suggest that parents perceive they have established tooth brushing as an important routine behaviour in family life but that the nature of the parent's involvement is less than optimal because of difficulties managing the behaviour of young children. It appears that difficulties are not due to a lack of memory, but a lack of interpersonal skills to manage children's behaviour as they develop and environmental influences within the circumstances in which families live. Interventions to promote greater involvement of parents in tooth brushing need to focus on practically supporting parents to develop these skills while acknowledging social, cultural and environmental contexts (Greenhalgh et al. 2015). Incorporating training in PSB into parenting programmes is one approach that would provide this support in a way which avoids 'victim blaming' parents (Watt 2007). Worldwide, various group-based parenting programmes are run which have been developed based on behaviour change theory to provide support to parents within their own local communities. Parents suggested that when their child was around 18 to 24 months their parental skills were tested and many of the parenting programmes are aimed at parents of young children of this age. Further research is needed to develop a PSB intervention that could be incorporated into these programmes and evaluate the impact of the interventions on parent's involvement in tooth brushing and ultimately dental caries prevalence.

The strengths of the study include 1) the diverse sample of parents involved who lived in deprived areas 2) recruiting parents of children with and without caries 3) the use of the TDF as a theoretical framework 4) robust data collection and analysis by a multidisciplinary team. The approach taken to sampling was chosen to include a wide range of parents including parents of different ethnicities, first languages and parents living in deprived areas. This approach was taken given the relationship between dental caries and socio-economic status (Schwendicke et al. 2015), the high prevalence of dental caries in the primary teeth of children of Pakistani or Bangladeshi origin (Conway et al. 2007, Marcenes et al. 2013) and as research has largely been limited to parents of white ethnic origin. Previously, difficulties have been described engaging South Asian parents in research (Macneill et al. 2013), this was facilitated by links to other research and public health projects and the availability of a trained interviewer who spoke Urdu. In this study as a composite area-based measure of deprivation, the Index of Multiple Deprivation, was used it was not possible to determine the socio-economic status of parents who participated. However, such deprivation indices have been shown

to be sensitive to variations in oral health behaviours and to have a valuable role to examine how features of places and people influence oral health (Locker 2000).

The TDF was used to guide the study and resulted in insights not previously identified in earlier studies of PSB. The TDF was used in a study of parents concerning healthy eating (Curtis and Lahiri, 2015) and there were similar findings in terms of the central role of the mother in the health behaviour, the importance of the interpersonal relationship between parent and child and the potential for influences from grandparents to be both positive and negative. However, while the use of this framework can be considered a strength of this study, the potential limitations of this approach should also be considered. Concerns have been expressed about the use of the TDF making interviews too focused and restrictive (Francis et al. 2012) although in this case there was good coverage of data across the domains suggesting it was an appropriate choice of theory for this study. During the interviews data did emerge that was outwith the topic guide and TDF particularly about attendance at the dentist but this was not judged to be relevant to the aim of the study. Further criticisms include the lack of specified relationships between the domains and low agreement between those involved in the analysis (Francis et al. 2012). This was not a problem we encountered. The interviews and data analysis were conducted by several researchers with a range of different backgrounds (paediatric dentistry, dental public health, psychology and health psychology) with discussions held at various stages in the analysis to develop consensus about the content of each domain, particularly where domains appeared to overlap and to facilitate triangulation.

Conclusions

The results of our study have implications for the development of interventions to improve PSB that recognise the importance of i) environmental influences ii) developing parenting skills and iii) the changing support needed by parents as their children mature. The findings of this study will inform the development of an intervention to improve implementation of guidance on PSB.

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Conflict of interests

There are no conflicts of interest

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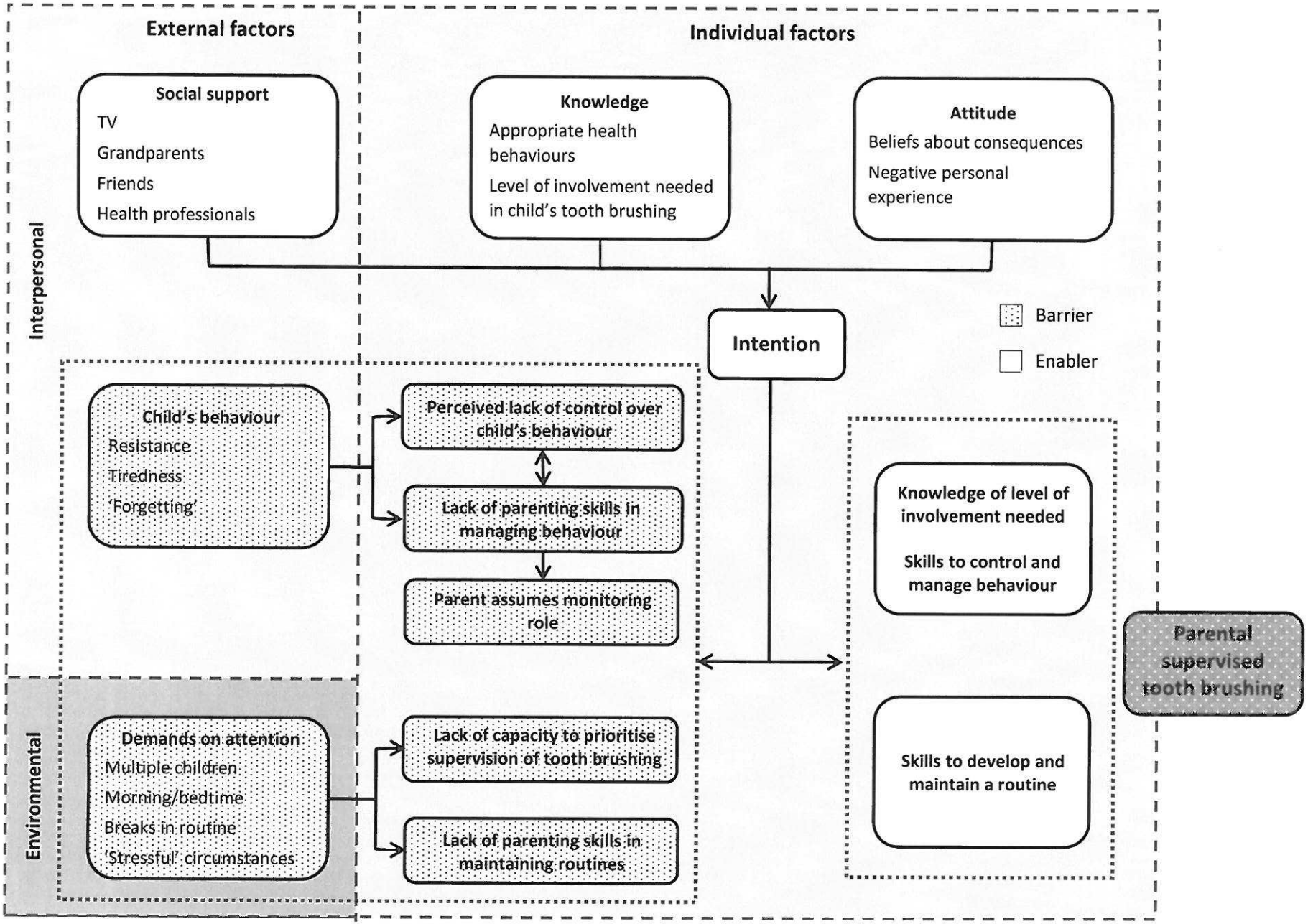
	Russian		White British		Polish	Pakistani		
Age of child	Never attended	Attended dentist	Never attended	Attended dentist	Attended dentist	Never attended	Attended dentist	Total
0-2 years	0	0	1	2	0	2	1	6
2-4 years	0	0	1	8	0	2	3	14
4-6 years	0	1	0	3	1	0	2	7
Total	0	1	2	13	1	4	6	27
	1		15		1	10		

Table 1. Characteristics of the participants from the two settings of Bradford and Barnsley


External factors
Individual factors
Interpersonal
Social support
TV
Grandparents
Friends
Health professionals
Knowledge
Appropriate health behaviours
Level of involvement needed in child's tooth brushing
Attitude
Beliefs about consequences
Negative personal experience
Intention
Barrier
Enabler
Child's behaviour
Resistance
Tiredness
'Forgetting'
Perceived lack of control over child's behaviour
Lack of parenting skills in managing behaviour
Parent assumes monitoring role
Knowledge of level of involvement needed
Skills to control and manage behaviour
Skills to develop and maintain a routine
Parental supervised tooth brushing
Environmental
Demands on attention
Multiple children
Morning/bedtime
Breaks in routine
'Stressful' circumstances
Lack of capacity to prioritise supervision of tooth brushing
Lack of parenting skills in maintaining routines